Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

SM68
no. 4

LIBRARY
NOV 23 1959
U. S. DEPARTMENT OF AGRICULTURE

SILVICAL CHARACTERISTICS of SWAMP WHITE OAK

F. Bryan Clark

Central States Forest Experiment Station Miscellaneous Release 25
U. S. Department of Agriculture . . . . . Forest Service

This is the eleventh of a series of 17 papers dealing with the silvical characteristics of forest trees important in the Central States region. The following species are included in this series. (Those marked with an asterisk have already been published.)

*Ohio buckeye
Yellow buckeye
*Northern red oak
*Black oak
*Chinkapin oak
*Pin oak
*White oak
*Swamp white oak
Bur oak
Butternut
*Black walnut
*Shellbark hickory
Sycamore
*Honeylocust
Hackberry
Black locust
*Eastern redcedar

Papers covering additional important American species will be issued by other Forest Experiment Stations of the U. S. Forest Service.

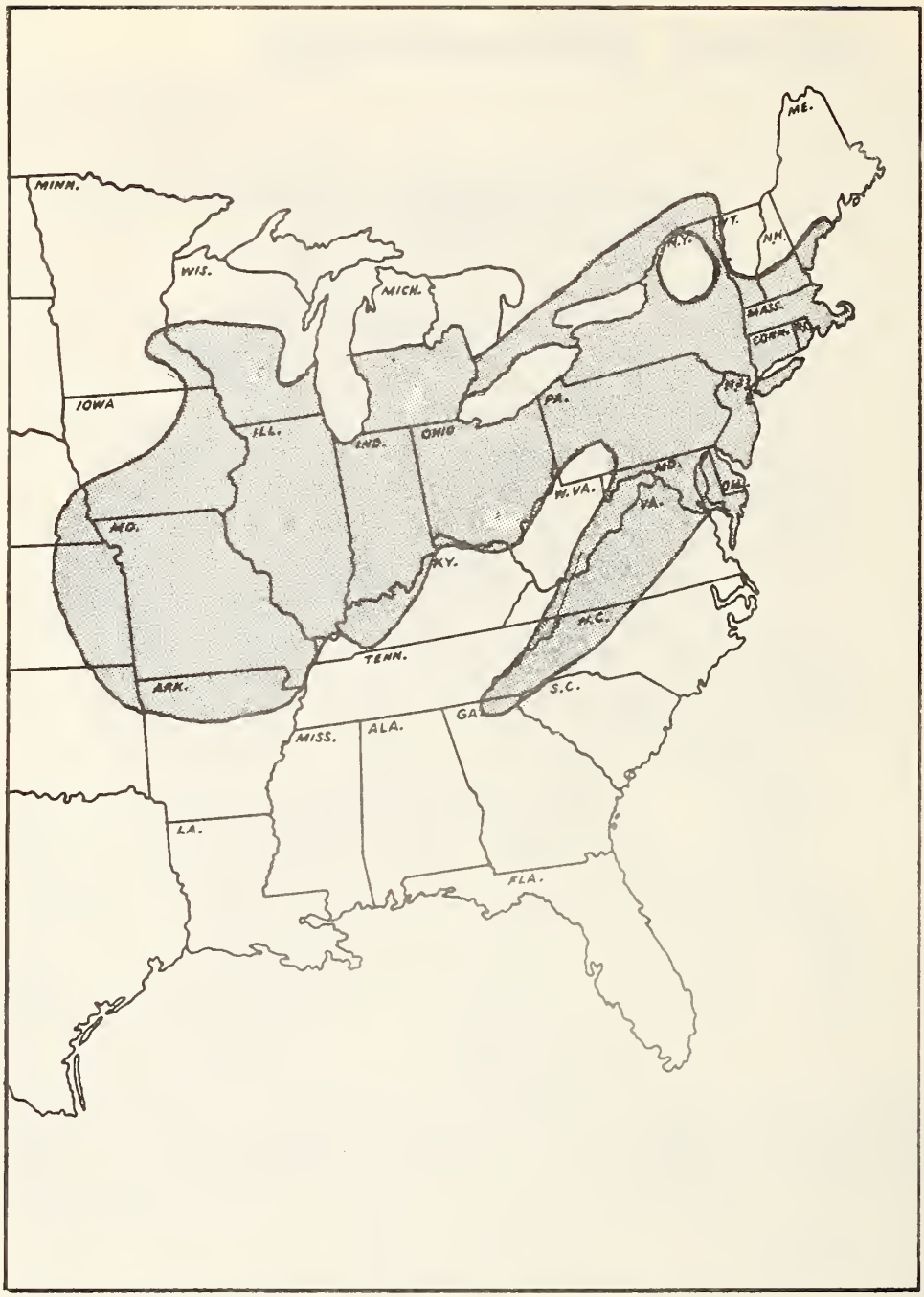
Central States Forest Experiment Station, U. S. Dept. of Agriculture
Forest Service, 111 Old Federal Building, Columbus 15, Ohio
W. G. McGinnies, Director
March 1958

Silvical Characteristics of Swamp White Oak

F. BRYAN CLARK, forester
Bedford Field Office

Swamp white oak (Quercus bicolor Willd.) derives its specific name from the color of its foliage which is silvery white beneath and bright green above. This species belongs to the "chestnut oak" group; the leaves are toothed and shallowly lobed. Swamp white oak may be identified by the acorns which are set on long peduncles and by the scaly bark on the trunk and twigs. On some twigs and branches the bark exfoliates and gives the tree a recognizable appearance.

DISTRIBUTION (9, 10, 14, 15, 16, 19)[1/]



1/ Numbers in parentheses refer to Literature Cited, p. 8.

SITE

Climate

The climate within the range of swamp white oak varies widely. Mean annual temperature ranges from 60° F. in Arkansas to 40° F. in southern Ontario. Extremes in temperature may range from 105° F. to -30° F. Annual precipitation averages from 25 inches in southeast Minnesota to 50 inches in northeast Arkansas. The frost-free period varies from 7 months in the southern part of the range to 4 months in the northern part (22).

Soils and Physiography

Swamp white oak grows best on deep, moist, fertile soil (3, 9, 15, 17). Deam and Shaw (7) state that in Indiana it is usually found in wet places having a hardpan in the subsoil. This species and its associates can survive in soils with a lower air content than can species in the maple-oak-beech associations (8). Swamp white oak may be found on sites subjected to occasional flooding (1).

The tree usually grows along stream borders, on the edges of swamps, and in low, wet flats and meadows. Braun (1) and Chapman (6) list its occurrence on undissected, poorly drained Illinoian till plain in southeastern Indiana and southwestern Ohio.

Associated Species

All of the associate tree species of swamp white oak are commonly found on low, wet sites. Associates commonly listed are: American elm, American basswood, black ash, hickories, pin oak, red maple, northern red oak, silver maple, sweetgum, sycamore, yellow-poplar, white ash, various white oaks, willow, and others (13, 17, 18). Deam and Shaw (7) state that the most common associate of swamp white oak in Indiana is pin oak.

In Forest Cover Types of America (18) swamp white oak is listed as an associate species in three types: Black ash-American elm-red maple; bur oak; silver maple-American elm.

Swamp white oak usually occurs as single trees, scattered throughout a stand. However, it may be abundant in small areas or occur in groves (3, 9).

The acorns of swamp white oak are sweet, like others in the white oak group, and are excellent winter food for squirrels (12). In a study conducted in Wisconsin swamp white oak acorns made up 27 percent of the wood duck diet (20). Van Dersal (25) reports that this species supplies food for sapsuckers.

LIFE HISTORY

Seeding Habits

The flowers of swamp white oak may appear during the months of April, May, or June depending upon the specific location of the tree (3, 17, 23). Male and female flowers are found on the same tree.

The acorns usually occur in pairs on slender stalks 1 1/2 to 4 inches in length. The chestnut-brown acorn is about 1 inch long and 1/2 to 3/4 inch in diameter. It is covered for one third of its length by a scaly cup (15). The fruit matures in 1 year and ripens and falls during the months of September and October. Gravity, rodents, and water are the primary dispersing agents.

Good seed crops of swamp white oak occur every 3 to 5 years with light crops during intervening years. The minimum commercial seed-bearing age is 35 years, optimum 75 to 200 years, and maximum 300 years. Collected seed does not need treatment to break dormancy. Based on a very limited number of samples, it was found that 98 percent of the seed collected was sound (23).

Vegetative Reproduction

Van Dersal (24) reports that swamp white oak will produce sprouts when the top is cut or killed.

Seedling Development

Like most white oaks, swamp white oak acorns germinate in the fall shortly after dispersal. Roots develop until growth ceases due to low temperatures. Undoubtedly many sprouting acorns are killed by freezing. Rodents (by burying acorns) are important in the establishment of swamp white oak and other species in the

white oak group. Little is known about the growth and development of swamp white oak at any stage of its life history. It is very probable that the tolerance of this species to shade is intermediate and that seedlings can be established under moderate competition.

Sapling Stage to Maturity

Under favorable conditions swamp white oak grows rapidly (17). The root system is usually shallow (24). This species is relatively long-lived, up to 300 years or more (12). In general it is said to be a medium-sized tree, 60 to 70 feet in height and 2 to 3 feet in diameter, although trees up to 100 feet tall and 7 feet in diameter have been reported (9).

Trees grown under competition in the forest develop a straight bole with ascending branches and a narrow, open crown. On the other hand, open-grown trees have a short, swollen bole with an open, rounded crown and persistent lower branches.

The species associations including swamp white oak are part of a physiographic climax. In the Illinoian till plain, Braun (1) refers to the species association as part of the wet-site succession. Friesner and Ek (8) refer to the Quercus-Ulmus association, in which they include swamp white oak as a "hydrophytic preclimax." Potzger (13) states that in central Indiana the subclimax association of pin oak, swamp white oak, and others is invaded by beech "as soon as the soil is elevated 10 to 12 inches above the water table."

ENEMIES

Swamp white oak is relatively free from serious attacks by insects and diseases. There are no reports of enemies peculiar to this species. Oak anthracnose is common but not fatal (17). Carter and Wysong (5) and Bretz (2) have reported that swamp white oak is susceptible to the oak wilt fungus (*Cerotocystis fagacearum*).

In an investigation of oak diseases in Illinois, Carter (4) found phomopsis canker and coniothyrium dieback on swamp white oak. In addition, an alternaria fungus was found on blighted petioles.

RACES AND HYBRIDS

Trelease (21) described two forms of swamp white oak: A mesophytic form with leaves that are "green and merely velvety on the lower surface;" a more xerophytic form with leaves that are "white--tomentulose beneath."

Little (10) lists the following hybrids of swamp white oak:

Quercus X *humidicola* (*Q. bicolor* X *lyrata*)
Q. X *jackiana* (*Q. alba* X *bicolor*)
Q. X *schuettei* (*Q. bicolor* X *macrocarpa*)
Q. X *substellata* (*Q. bicolor* X *stellata*)

In addition to the foregoing hybrids Palmer (11) includes *Quercus* X *nessiana* (*Q. bicolor* X *virginiana*).

SPECIAL FEATURES

The wood of swamp white oak is very similar to that of other white oaks. In fact the lumber is sold as white oak. The wood is hard, strong, and resistant to decay. Hence it is used for posts, pilings, and railroad crossties (17). Being a white oak, it can be used for bourbon cooperage. Wood quality is often inferior due to poor natural pruning (9). Because the wood is often hard and "brashy," swamp white oak is often rejected for such special uses as veneer logs. This undesirable characteristic is usually related to a rapid growth.

TREE SPECIES MENTIONED

Black ash	-	*Fraxinus nigra* Marsh.
White ash	-	*F. americana* L.
American basswood	-	*Tilia americana* L.
Beech	-	*Fagus* L.
American elm	-	*Ulmus americana* L.
Hickory	-	*Carya* spp.
Red maple	-	*Acer rubrum* L.
Silver maple	-	*A. saccharinum* L.
Bur oak	-	*Quercus macrocarpa* Michx.
Northern red oak	-	*Q. rubra* L.
Pin oak	-	*Q. palustris* Muenchh.
Swamp white oak	-	*Q. bicolor* Willd.
Sweetgum	-	*Liquidambar styraciflua* L.
Sycamore	-	*Platanus occidentalis* L.
Yellow-poplar	-	*Liriodendron tulipifera* L.
Willow	-	*Salix* spp.

LITERATURE CITED

(1) Braun, E. Lucy
1950. Deciduous forests of eastern North America. 596 pp., illus. Philadelphia.

(2) Bretz, T. W.
1951. Oak wilt. Jour. Forestry 49: 169-171.

(3) Brush, Warren D.
1946. Knowing your trees -- swamp white oak. Amer. Forests 52: 172-173, illus.

(4) Carter, J. Cedric
1941. Preliminary investigation of oak diseases in Illinois. Ill. Nat. Hist. Survey Bul. 21: 195-230.

(5) ------- and Wysong, N. B.
1951. Isolation of the oak wilt fungus from swamp white oak. Plant Disease Rptr. 35: 173-174.

(6) Chapman, A. G.
1942. Forests of the Illinoian till plain of southeastern Indiana. Ecol. 23: 2, 189-198.

(7) Deam, Charles C., and Shaw, T. E.
1953. Trees of Indiana, 3 rev. ed. Pub. No. 13a, Ind. Dept. Cons., Indianapolis, 330 pp., illus.

(8) Friesner, Ray C., and Ek, Charles M.
1944. Correlation of microclimatic factors with species distribution in Shenk's Woods, Howard County, Indiana. Butler Univ. Bot. Studies 6: 87-101.

(9) Harlow, William M, and Harrar, Elwood S.
1941. Textbook of dendrology, 2 ed. 542 pp., illus. New York.

(10) Little, Elbert L., Jr.
1953. Check list of native and naturalized trees of the United States (including Alaska). U.S. Forest Serv., Agr. Handbk. No. 41. 472 pp.

(11) Palmer, Ernest J.
1948. Hybrid oaks of North America. Arnold Arboretum Jour. 29: 1-48.

(12) Peattie, Donald Culross
1950. A natural history of trees of eastern and central North America. 606 pp., illus. Boston.

(13) Potzger, John E.
1935. Topography and forest types in a central Indiana region. Amer. Midland Nat. 16: 212-229.

(14) Preston, Richard J., Jr.
1948. North American trees. Ames, Iowa. 371 pp., illus.

(15) Sargent, Charles S.
1933. Manual of the trees of North America. 910 pp., illus. Boston and New York.

(16) Small, John K.
1903. Flora of the southeastern United States. Pub. by the author 1903.

(17) Smith, N. F.
1953. Swamp white oak. Mich. Conserv. 22 (4): 31-32.

(18) Society of American Foresters
1954. Forest cover types of North America (exclusive of Mexico). 67 pp., illus. Washington.

(19) Stemen, Thomas R., and Myers, W. Stanley
1937. Oklahoma flora. Oklahoma City, Okla. 706 pp., illus.

(20) Stollberg, Bruce P.
1950. Food habits of shoal-water ducks on Horicon Marsh, Wisconsin. Jour. Wildlife Mgt. 14: 214-217.

(21) Trelease, William
1924. The American oaks. Memoirs of the National Academy of Sciences, Vol. XX. 255 pp., illus. Washington.

(22) U. S. Department of Agriculture
1941. Climate and man: Yearbook of agriculture. 1,248 pp., illus.

(23) -------
1948. Woody-plant seed manual. Misc. Pub. 654. 416 pp., illus.

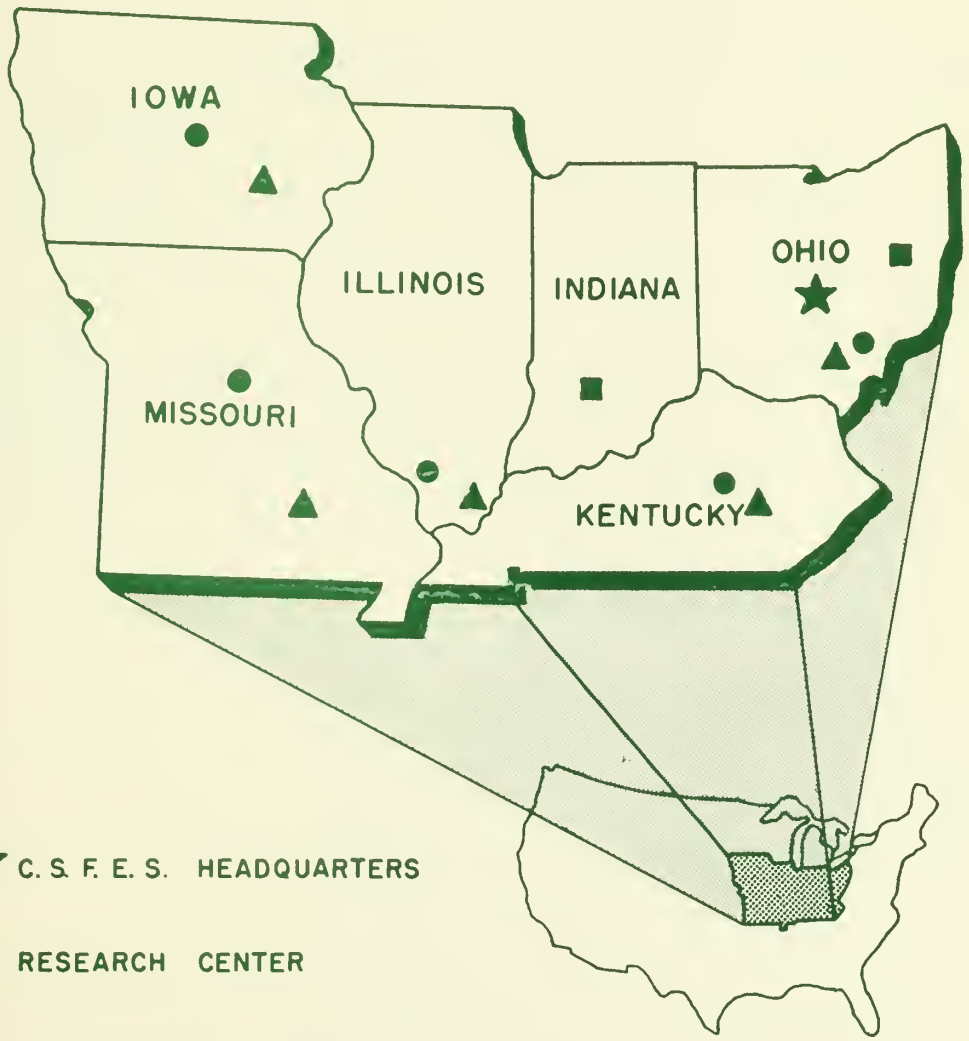
(24) Van Dersal, William R.
1938. Native woody plants of the United States - their erosion-control and wildlife values. U. S. Dept. Agr. Misc. Pub. No. 303. 362 pp., illus.

(25) Van Dersal, William R.
1940. Utilization of oaks by birds and mammals. Jour. Wildlife Mgt. 4: 404-428.

Agriculture - Forest Service - Columbus, Ohio

TERRITORY SERVED BY THE

CENTRAL STATES FOREST EXPERIMENT STATION

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE